

**NATURAL AND CULTURAL  
RESOURCES MANAGEMENT PLAN  
and environmental assessment**




**CASA GRANDE**  
NATIONAL MONUMENT/ARIZONA



NATURAL AND CULTURAL RESOURCES  
MANAGEMENT PLAN  
AND ENVIRONMENTAL ASSESSMENT

CASA GRANDE NATIONAL MONUMENT  
NATIONAL PARK SERVICE  
DEPARTMENT OF THE INTERIOR  
ARIZONA

June 1980



Digitized by the Internet Archive  
in 2012 with funding from  
LYRASIS Members and Sloan Foundation

<http://archive.org/details/naturalculturalr00npssc>

## TABLE OF CONTENTS

ENVIRONMENTAL SUMMARY.....	1
NATURAL AND CULTURAL RESOURCES MANAGEMENT PLAN.....	3
INTRODUCTION.....	3
RESOURCES MANAGEMENT OBJECTIVES.....	3
RESOURCES MANAGEMENT POLICIES.....	6
RESOURCES MANAGEMENT AND RESEARCH ACTIONS.....	10
RELATIONSHIP OF PROPOSALS TO OTHER PROJECTS AND PLANS.....	11
ENVIRONMENTAL ASSESSMENT.....	12
DESCRIPTION OF THE ENVIRONMENT.....	12
LOCAL AND REGIONAL ENVIRONMENT.....	12
Natural Environment.....	13
Cultural Environment.....	17
ENVIRONMENTAL IMPACTS OF PROPOSED ACTIONS.....	24
MITIGATING MEASURES INCLUDED IN THE PROPOSED ACTION.....	26
ADVERSE EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSALS BE IMPLEMENTED.....	26
RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY.....	26
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION.....	27
ALTERNATIVES TO THE PROPOSED PLAN.....	28
CONSULTATION AND COORDINATION.....	31
REFERENCES.....	34



## LIST OF ILLUSTRATIONS

FIGURE 1. GENERAL VICINITY MAP OF CASA GRANDE RUINS NATIONAL MONUMENT.....	4
FIGURE 2. MAP OF MAJOR RUINS AND ARCHEOLOGICAL SITES AT CASA GRANDE.....	5
FIGURE 3. THE BIG HOUSE AND SURROUNDING MESQUITE TREES.....	9
FIGURE 4. DEAD MESQUITE TREES AT CASA GRANDE.....	9

## LIST OF TABLES

TABLE 1. TOTAL VISITS TO CASA GRANDE.....	14
TABLE 2. MONTHLY WEATHER STATISTICS AT CASA GRANDE.....	16
TABLE 3. THE HOHOKAM CHRONOLOGY.....	19





## ENVIRONMENTAL SUMMARY

The Natural and Cultural Resources Management Plan for Casa Grande Ruins National Monument presents a long-term action program for managing the area's resources. Its accompanying environmental assessment analyzes and documents the environmental impacts of the proposed actions.

Proposed Actions: The proposed projects deal with the management of natural and cultural resources at Casa Grande Ruins National Monument. Recommended action for natural resources include an inventory of flora and fauna and a study of the effects of the dropping water table for information needed to preserve the natural environment. Cultural resources projects proposed are stabilization of the Casa Grande and Compounds A and B; an archeological overview of the Gila Valley to add information about sites outside the monument; a historic resources study relating to several monument buildings; a study of astronomical significance of the Casa Grande; inventory and mapping of the monument and surrounding area; photographic documentation of artifacts from Fewkes' and Mindeleff's collections which are now in Washington; and completion of the Compound F excavation report.

Impacts: Stabilization projects will lessen deterioration of prehistoric structures, but may also alter them in some ways, causing loss of cultural resources. The archeological overview, mapping project, study of astronomical significance, photographic documentation of artifacts, and completion of excavation report will greatly expand knowledge of the area while having little or no adverse impact on resources. Natural resources proposals will provide information necessary for competent management of the monument's natural resources. The historic resources study will insure preservation of historic structures.

Alternatives: Alternatives of no action were considered for each proposal. Stabilization alternatives considered included emergency stabilization only and reconstruction of ruins, both of which would involve loss to cultural resources. A more limited archeological overview was considered. A study of all possible uses of the Casa Grande was considered as an alternative to a separate astronomical study. Shipping artifacts directly from the Smithsonian to Casa Grande or Western Archeological Center was considered as an alternative to the photographic documentation project. Compound F could be further excavated as an alternative to completion of the 1936 excavation report, but this would involve duplication of effort and loss to cultural resources. More limited natural resources inventories were considered and rejected because of their limited value.

Conclusion: Because all of the proposed actions are designed to minimize or eliminate significant adverse environmental impacts, it is recommended that the Casa Grande Ruins Natural and Cultural Resources Management Plan be assigned a negative declaration.



## NATURAL AND CULTURAL RESOURCES MANAGEMENT PLAN

### Introduction

Because cultural and natural resources are fragile and often non-renewable, their preservation under current laws, policies and standards is the primary goal of park management. The intent of this plan is to insure that the monument is managed as a public preserve within which these resources are strictly protected, and disturbed only when no alternatives exist to meet management, interpretive, or research needs.

Casa Grande Ruins National Monument is located in southcentral Arizona, about midway between Phoenix and Tucson (Fig. 1). The Gila River passes one and a half miles to the north.

The monument area was occupied by an early cultural group, the Hohokam, who were irrigation farmers, but who also used wild food resources. Pre-historically, the Casa Grande area was probably dominated by a mesquite-saltbush community. It was conveniently located for irrigation farming through the diversion of water from the Gila River via canals.

Within the monument boundaries, which enclose 472.5 acres, are at least 59 archeological sites, including at least 15 compounds, and probably more (Fig. 2 shows the location of the major cultural resources discovered to date). There are mounds, depressions, caliche-earth walls, and buried pithouses throughout the area. Collectively, the monument sites--all on the upper terrace to the south of the Gila--show a relatively long period of occupation spanning at least 800 years.

The entire flat desert terrain is dominated by the Casa Grande, a large Classic Hohokam three-story structure built of soil mixed with caliche. It is the only surviving example of such a structure, and is of national significance because of its archeological importance and unique architectural characteristics, as well as its probable association with significant events in the history of the ancient Hohokam people.

The monument is listed on the National Register of Historic Places.

### RESOURCE MANAGEMENT OBJECTIVES

The following management objectives come from the Statement for Management for Casa Grande National Monument developed in 1977:

- .Protect and preserve the prehistoric, historic, and natural resources of the Casa Grande National Monument to the maximum extent possible.



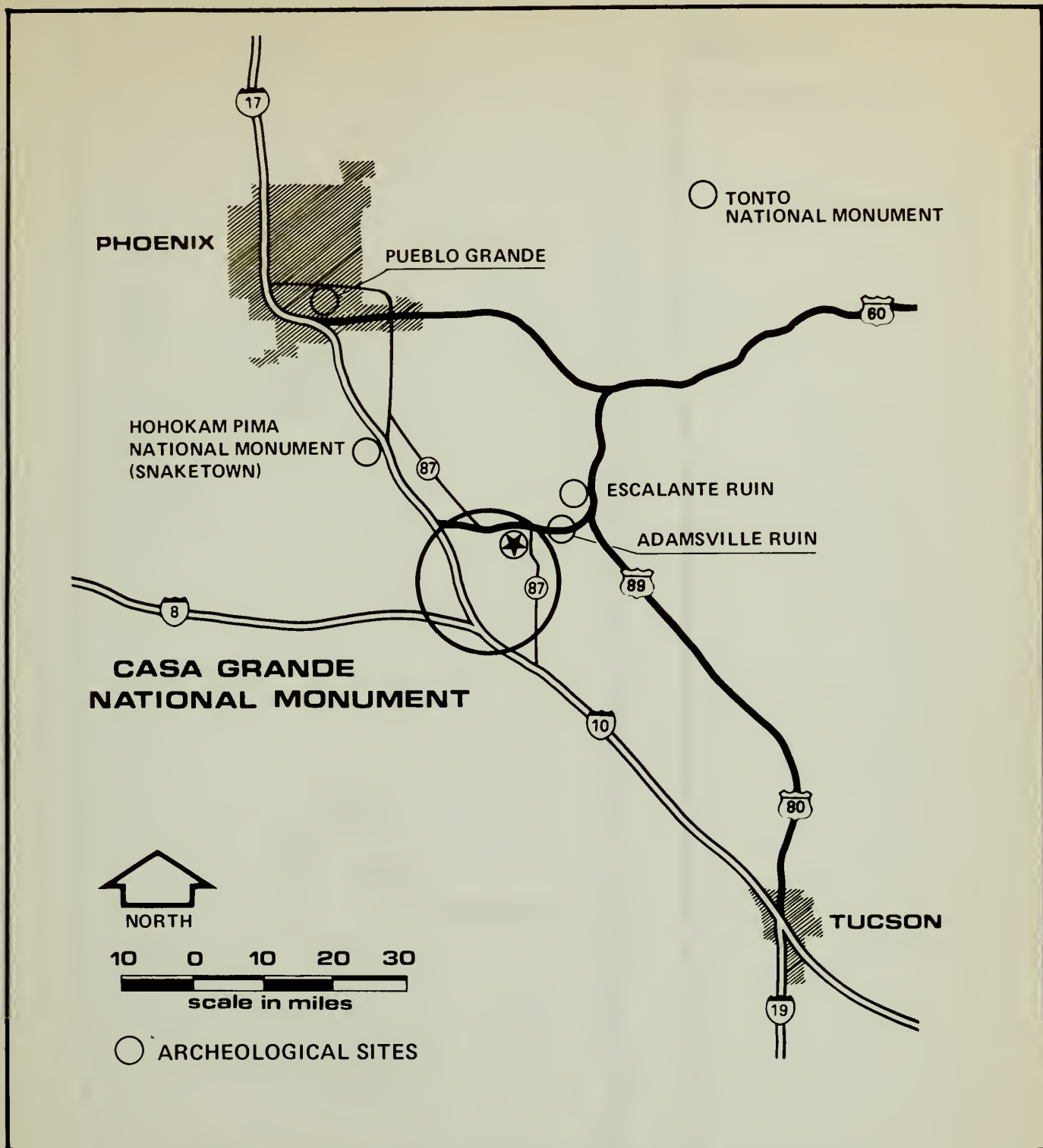


FIGURE 1. General vicinity map of Casa Grande National Monument.

# CASA GRANDE

## national monument

U.S. DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

303 80,004

OCT. 79 | WRO-PP





## LEGEND



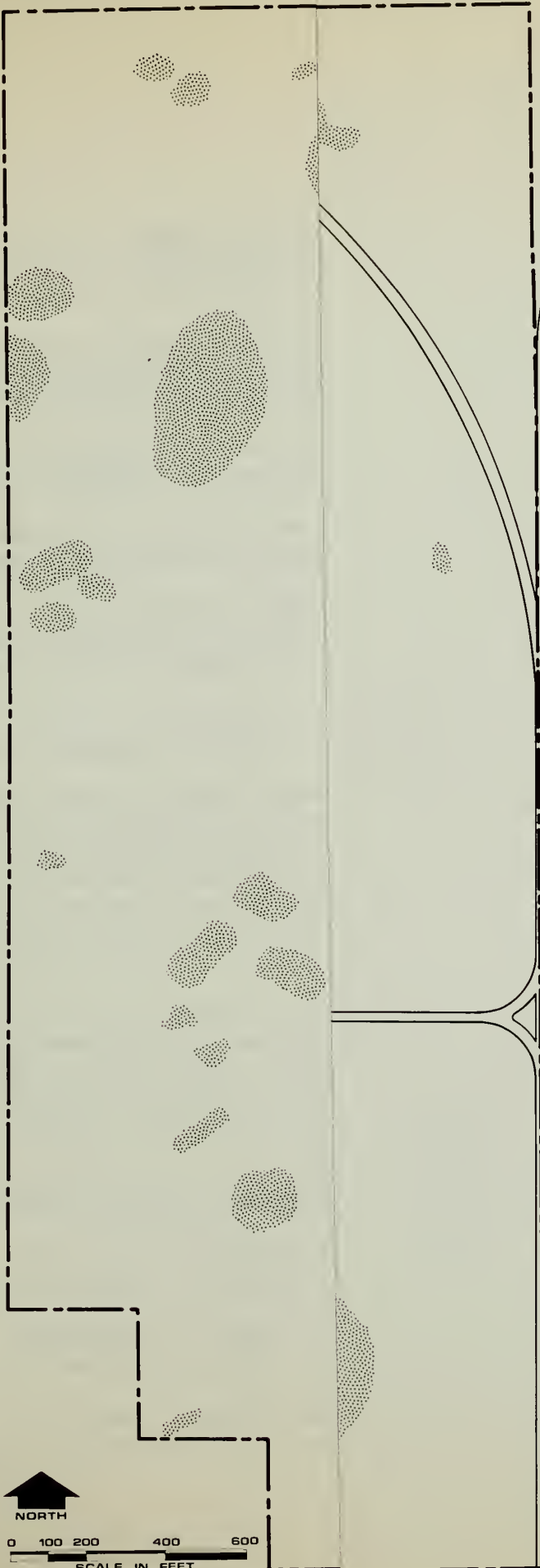
BUILDING



COMPOUNDS



UNEXCAVATED SITES



NORTH

0 100 200 400 600



SCALE IN FEET

U.S. Department of the Interior/National Park

# CASA GRANDE

## national monument

303 80,005  
OCT. 79 WRO-PP

- LEGEND**
-  BUILDING
  -  COMPOUNDS
  -  UNEXCAVATED SITES



**CASA  
GRANDE**

**national  
monument**

**FIGURE 2. Map of Major Ruins and Archeological Sites at Casa Grande**



.Formulate a long-range policy based on sound research for the preservation or restoration of the desert environment that would be appropriate and pertinent to the prehistoric environment.

.Identify all prehistoric (archeological) and historic resources, stabilize those necessary for appropriate research and interpretation, and maintain them to preserve those resources.

.Make available Casa Grande National Monument resources for the education, enjoyment, and use by visitors.

.Communicate the significant environment and culture of the Hohokam based on appropriate research and interpretive methods.

.Coordinate planning, development, and management of the monument with other historical and recreational sites in the region such as Hohokam Pima National Monument.

#### RESOURCES MANAGEMENT POLICIES

Casa Grande Ruins National Monument was established for the primary purpose of preserving the prehistoric cultural remains found within its boundaries. The monument also protects historic structures and natural features, and provides for compatible public uses of its resources. The following policy statements establish priorities for the management of these various resources, and provide specific direction to the National Park Service in its administration of the monument.

These policies are based on pertinent public laws, policy guidelines established by the National Park Service for application servicewide, and the management objectives for Casa Grande. They will be subject to periodic review, and may be modified in the light of future developments in archeological and natural science research pertaining to the monument.

I. Preservation of the monument's prehistoric cultural resources shall be the paramount concern of management.

a. Ruins will be stabilized to prevent further deterioration in accordance with National Park Service Management Policies concerning ruins.

b. Restoration of ruins to a prehistoric condition will not be attempted, since such restoration would:

(1) In most instances involve substantial reconstruction based on conjecture rather than solid archeological data.

(2) Not be essential to public understanding and appreciation of the cultural association for which the monument was established.

(3) Involve alteration and destruction of prehistoric cultural resources protected by the monument.

II. No resource management action having the potential for disruption of the monument's prehistoric cultural resources will be undertaken until:

a. An environmental assessment of the proposed action's effects has been made with the concurrence of the Regional Office, in accordance with current guidelines for environmental assessment.

b. A professional archeologist has conducted a field inspection, which may or may not involve test excavations, and has filed a report documenting a determination of no adverse effect by the Western Archeological Center.

c. Steps have been taken to comply with Executive Order 11593 (in cases involving alteration of potential National Register property) and Section 106 of the Historic Preservation Act as described in the latest procedures published in the Federal Register by the Advisory Council on Historic Preservation.

III. Natural resources will be managed to protect the inherent integrity and spontaneity of the natural environment, unless natural changes threaten the monument's cultural resources.

a. Except in cases where the protection of cultural resources will require some environmental modification, natural resource management actions will be limited to those necessary for the preservation of a dynamic natural environment.

b. Natural resource management actions will seek to allow spontaneous natural change in the environment, while controlling changes due to human influences.

c. Restoration of the prehistoric environment will not be attempted, since:

(1) Restoration is not essential to visitor understanding of the values associated with the monument.

(2) Insufficient historical, archeological, and natural science data exist to permit restoration with a minimum of conjecture.

(3) Such restoration would, by seeking to artificially perpetuate environmental conditions characterizing a particular time, place limits on spontaneous natural change.

(4) Restoration of such environmental elements as the shallow water table and prehistoric drainage patterns is virtually impossible in view of the small size of the monument and the magnitude of changes immediately outside monument boundaries.

IV. Historic monument buildings accepted for inclusion on the National Register of Historic Places will be maintained in accordance with applicable federal laws and National Park Service Management Policies, and will be preserved in place, unless it can be demonstrated that such a building, by its physical presence, constitutes a threat to the preservation of nearby prehistoric cultural features.

V. Within the constraints imposed by preservation requirements, the resources of the monument will be made available to the public for purposes of education, enjoyment, and use.

a. Management will maintain an ongoing program of research aimed at further defining the physical and cultural environment of the Hohokam.

b. Visitor enjoyment and appreciation will be enhanced through an interpretive program which will strive to communicate an accurate understanding of the prehistoric Hohokam people and the significance of their culture.



**FIGURE 3.** The Big House and surrounding mesquite trees.



**FIGURE 4.** Dead mesquite trees at Casa Grande resulting primarily from lower water tables associated with increased irrigation use outside the monument.



## RESOURCES MANAGEMENT AND RESEARCH ACTIONS

Stabilization of the Casa Grande. This large multi-story structure (Fig. 3) dominates the entire flat desert area encompassed by the monument boundaries. It is the only surviving example of a Hohokam "big house". Its life is limited unless satisfactory stabilization is accomplished. Pre-stabilization research and complete stabilization are proposed.

Stabilization of Compound A (excluding the Casa Grande). The low walls surrounding the Casa Grande continue to deteriorate, despite past attempts at stabilization. Pre-stabilization research and complete stabilization of the walls with a material compatible with the original caliche-earth construction is proposed.

Archeological Overview of the Gila River Basin. A synthesis of all archeological research for the entire Hohokam sequence is proposed. Sites outside the monument will be identified and studied as sources of additional information.

Study of the Casa Grande's Astronomical Significance. The possible function of the Casa Grande as an observatory will be further investigated.

Stabilization of Compound B. The walls and mounds of Compound B continue to deteriorate, despite past attempts at stabilization. Erosion has forced the backfilling of part of the compound. Pre-stabilization research, re-excavation of backfilled portions, and complete stabilization with materials compatible with the original construction are proposed.

Photographic Documentation of Artifacts. Two collections of artifacts from early excavations at the monument are in Washington, D.C. They are unavailable for research and interpretation by monument personnel. A qualified individual will undertake the photography, description, and measurement of these artifacts.

Completion of Excavation Report. The 1930 Van Bergen Expedition excavation of Compound F was never reported. Field notes and obtainable artifacts will be analyzed to extract all pertinent information.

Inventory and Mapping of Resources of the Monument and Surrounding Area. An aerial survey and continued ground survey will identify prehistoric canals and possible new archeological sites. The survey will encompass the monument and the area surrounding it known to have been under irrigation in prehistoric time.

Historic Resources Study. Five historic park buildings will be nominated to the National Register of Historic Places.

Natural Resources Inventory. The flora and fauna of the area from pre-historic time to the present will be inventoried, through field research and historical and archeological studies.

Impact of the Dropping Water Table. The relationship between the dropping water table and the death of mesquite trees in the monument will be studied. Other direct and indirect effects of the declining table on the vegetational composition of the monument will be examined. Management actions will be proposed for the enhancement and preservation of habitat for natural vegetation.

#### RELATIONSHIP OF PROPOSALS TO OTHER PROJECTS AND PLANS

The proposals contained in this plan were developed within the context of the various constraints and influences on management delineated in the Statement for Management for Casa Grande Ruins National Monument. This plan is entirely compatible with that statement.

This plan supports and is supported by the Outline of Planning Requirements for Casa Grande Ruins National Monument. The resource preservation and interpretation problems identified in the Outline are the basis for most of the cultural and natural resource project proposals included in this plan. The acquisition of information on cultural and natural resources will provide the data needed to prescribe effective management actions and will supplement the information upon which the interpretive program is based.

One of the most important external influences on the monument environment is the continued fluctuation and general decline in the water table from deep-well pumping in the areas immediately adjoining the monument. The effects on vegetation of this drop in the water table (Fig. 4) will be studied under resource project proposals in this plan.

## ENVIRONMENTAL ASSESSMENT

### Description of the Environment

Casa Grande Ruins National Monument, in the Gila Valley of southcentral Arizona, was set aside because of its archeological values which include the Casa Grande (Big House) and other prehistoric remains. The Casa Grande was one of the first prehistoric ruins to receive protection from the Federal Government. The original reservation of 480 acres was made in 1892, under Congressional authority dated March 2, 1889. The area was administered by the General Land Office until 1918 when it became a National Monument within the newly established National Park Service. The monument now contains 472.5 acres.

Dominating the landscape is the Casa Grande itself, a unique three story structure of coursed caliche mud built by Indian farmers about 600 years ago. It is located in a walled village containing the weathered remains of one, two and three storied buildings. Scattered over the rest of the monument are the ruins of additional walled villages, or "compounds", and other prehistoric sites.

Father Kino, a Jesuit missionary, is credited with being the first European to visit the Casa Grande, in 1694. At the time the region represented the unexplored northwestern frontier of New Spain.

Since 1694 visitors have conjectured as to the origin and history of the builders of the Casa Grande and neighboring ruins; the general outline of their story is fairly well known now, but some of the details are still not clear. There have been periodic archeological excavations on the Casa Grande Ruins National Monument since 1891, but no one site has yet been completely excavated and much investigation remains to be done.

### LOCAL AND REGIONAL ENVIRONMENT

The entrance of Casa Grande Ruins National Monument is about one half mile north of Coolidge, Arizona, which had an estimated population of 7,275 in 1977. The monument is located near the center of Pinal County, which had an estimated 89,900 inhabitants in 1977. Arizona's two largest population centers, Phoenix and Tucson, are located within a 70 mile radius of the monument. Estimated 1978 populations were 690,100 for Phoenix and 309,600 for Tucson.

The U. S. Department of Commerce projects a 56% increase in population for Arizona between 1975 and 2000. The state will be one of the two fastest growing states in the nation.



The mild winter climate accounts for large winter tourism which is reflected in Casa Grande Ruins' visitation records. The four months of heaviest visitation at the monument are January through April. Between 1972 and 1976, visits for the busiest month, February, were double that of the slowest month, September (Table 1).

The environmental effects of increasing population growth and development in the region are discussed in the following description of the natural environment.

#### THE NATURAL ENVIRONMENT

Climate and Geology. The Casa Grande ruins lie one and a half miles south of the Gila River, about 50 miles upstream from its junction with the Salt River. These two streams, the principal drainages of southern Arizona, originate in mountainous regions to the northeast and have cut shallow valleys across the plains of their lower courses. Large dams now interrupt their flow.

Physiographically, the area is part of the Basin and Range Province, with the greatly eroded roots of mountain ranges standing a few hundred feet above wide, almost level plains. The ranges seen from Casa Grande Ruins National Monument are mostly pre-Cambrian granites and schists; some are cut by younger granitic rocks and are flanked by Tertiary lava flows. The interrange plains are nearly level basins filled with alluvial debris as much as 2,000 feet deep near their centers.

In central Arizona, Basin and Range Province elevation ranges from 1,000 to 4,000 feet. At Casa Grande Ruins National Monument the elevation gently slopes from 1427 feet in the southeast corner to 1414 feet in the northwest corner.

Soil. The monument's soil has been placed in a series characterized by a lime hardpan with a highly calcareous surface soil. The type is specifically called Coolidge sandy loam, a "light grayish-brown soft friable gritty sandy loam. . .with a few lime-cemented nodules throughout the layer". (Poulson, p.51)

Caliche, the limy hardpan found 2 to 4 feet below the surface, is formed when calcium carbonate-bearing ground waters lose either moisture or carbon dioxide. The limy precipitate may occur in almost pure form, or it may cement together sands and gravels at the level of deposition. Caliche varies in hardness and in density. It may be impervious to water and result in eventual puddling. Caliche was used by the Indians in prehistoric mud wall construction.



Table 1. Total Visits to Casa Grande from 1972 to 1976

	1972	1973	1974	1975	1976	VISITORS PER MONTH 5-YEAR AVERAGE
JAN	13,200	15,200	8,900	12,200	16,700	13,240
FEB	15,700	18,800	9,200	16,200	22,500	16,480
MAR	14,300	21,000	10,100	16,700	19,100	16,240
APR	11,700	17,700	10,200	13,100	15,300	13,600
MAY	8,300	9,700	7,900	9,400	9,900	9,040
JUNE	8,900	9,200	6,900	11,300	8,600	8,980
JULY	8,400	9,100	7,400	11,700	8,600	9,040
AUG	7,800	7,400	8,300	10,900	8,500	8,580
SEPT	6,700	7,000	6,800	7,300	7,300	7,020
OCT	8,100	8,000	8,400	9,700	10,000	8,840
NOV	9,700	9,700	9,800	10,600	10,500	10,060
DEC	11,000	8,400	10,600	12,500	12,000	10,900
TOTAL	123,800	141,200	104,500	141,600	149,000	132,020

Vegetation. The major native vegetation types in the Basin and Range Province include creosotebush, saltbush, mesquite, paloverde and saguaro. At Casa Grande Ruins the dominant vegetation types are the creosote and saltbush.

The monument provides an example of creosotebush invading an area previously concentrated with saltbush. Saltbush withstands alkaline, toxic salt-concentrated soils better than other vegetation. As salts break down or wash away, other plants, such as the creosotebush, are able to grow in the soil.

Scattered about the monument are many dead mesquite trees. One study (Judd, et al) indicated that during the 1940s disease attacked trees already weakened by a serious drop in the water table. Most surviving mesquite trees occur in land depressions.

Annual herbs and grasses are most abundant in winter and spring, when moisture and temperature conditions are best for their growth. Most die in the intense heat of summer.

Wildlife. Numerous varieties of wildlife inhabit the monument. Snakes, lizards, rabbits, ground squirrels, and birds are common. Occasionally desert tortoises, gila monsters, coyotes, and stray dog packs are seen. No known threatened or endangered species exist within the monument.

Climate. The area is Sonoran Desert, an area of mild winters, high summer temperatures, and low annual rainfall (Table 2).

Rainfall in the area fluctuates considerably from year to year. The heaviest precipitation usually falls during July and August.

The growing season is long, averaging a little over 230 consecutive frost-free days. Only about 40 days a year record 31°F or below. During the past 16 years the earliest killing frost was October 29 (1971) and the latest killing frost was April 25 (1960).

Water Resources. A 1953 aerial photograph showed not quite half the land surrounding the monument as being undeveloped. Ten years later almost all the land immediately surrounding the monument was under cultivation.

With irrigation the desert is capable of producing crops of surprising variety and quantity. Modern machinery and farming methods have enabled agriculture to become the third major source of income for Arizona. Cotton is the main cash crop; alfalfa is second, followed by grains and grain sorghums. Farms border the monument on the west, north, and east, and along a portion of the south boundary.

Table 2. Monthly weather statistics for Casa Grande Ruins  
National Monument\*

16

DATE	AVERAGE HI	AVERAGE LO	RECORD HI	RECORD LO	AVERAGE PRECIPITATION IN INCHES
JAN	67°F	33°F	89°F	12°F	0.8
FEB	71°F	36°F	93°F	16°F	0.8
MAR	75°F	41°F	98°F	21°F	0.8
APR	86°F	46°F	106°F	25°F	0.3
MAY	95°F	54°F	116°F	32°F	0.1
JUNE	104°F	63°F	119°F	44°F	0.1
JULY	107°F	74°F	120°F	51°F	1.0
AUG	104°F	73°F	116°F	55°F	1.2
SEPT	100°F	65°F	114°F	44°F	0.9
OCT	90°F	49°F	108°F	25°F	0.7
NOV	76°F	40°F	99°F	17°F	0.6
DEC	68°F	35°F	89°F	15°F	1.1
AVERAGE TOTAL RAINFALL PER YEAR					8.6

\*Data compiled from monument weather records for the years 1935-1976.

Water for farming is obtained from storage reservoirs and by pumping. The Coolidge Dam, about 100 miles above the monument on the Gila, impounds water in the San Carlos Reservoir. Water is diverted into canals by gravity flow for irrigation. However, this supply has to be supplemented by ground water pumping.

Pumping consumes ground water faster than nature can replace it. For example, when the first well was dug at Casa Grande Ruins National Monument in 1902, water was standing at 10-16 feet. The water remained at that level until 1910. When a well was dug in 1918, the water level was reached at 42'6". By 1949 the water level had dropped to 102 feet. Beginning in 1952, water was piped to the monument from Coolidge because the well was no longer sufficient to supply the area's needs. At that time the water was at 180 feet yielding 14 gallons a minute.

Air Quality. Prehistorically, air quality was excellent except for occasional high levels of fugitive dust during periods of strongwinds. Air quality remains good, although modern agricultural and industrial activities in the region have contributed to some deterioration.

Agricultural practices contribute most to the current reduction in air quality. Cultivated fields surround the monument for miles in all directions, and contribute to a higher incidence of fugitive dust during windstorms. Aircraft frequently apply chemicals, mostly pesticides, to surrounding fields, and some carryover onto monument land is inevitable.

Photochemical pollutants from surrounding urban areas are not an important factor under normal weather conditions, except for the occasional reduction in long distance visibility. The Superstition Mountains, 35 miles north of the monument, are occasionally obscured by a brown haze originating over the Phoenix metropolitan area.

Copper smelters are located 40 miles east (Hayden) and 70 miles southeast (San Manuel) of the monument. Under normal circumstances, they have little effect on monument air quality, but during certain unusual weather situations may contribute either sulfur dioxide or ammonium sulfate. Though commercial crops in the Florence area (12 miles east of the monument) have sustained light sulfur dioxide damage, such damage is restricted to fast-growing annuals. The hardy native perennial monument plants are not susceptible, though spring wildflowers could conceivably be affected.

## CULTURAL ENVIRONMENT

Ethnography. The modern Pima and Papago Indians, who live nearby, may well be the lineal descendents of the prehistoric Hohokam. Some aspects of Piman culture, such as traditional Pima Basketry and Papago wine making, are currently interpreted at the monument with demonstrations and displays. If the



Hohokam-Piman connection is accepted, the monument affords an opportunity to study long-term cultural change as well as man's relationship to and interaction with the environment. Ethnographic data collected among the Pima and Papago are then crucial to the interpretation of the prehistoric Hohokam way of life.

Archeological Resources. Exposed features in the monument include forms of architecture known to have existed in the Classic Period of the Hohokam. There is also a ball court--a feature more typical of the earlier Hohokam periods.

The Casa Grande Ruins reflect primarily the period of occupation from A.D. 1150-1450, the classic culmination of the prehistoric Hohokam (Table 3). These people had been settled in southern Arizona's river valleys since about 300 B.C., and possessed a canal-oriented form of agriculture. Their cultural origins are still largely unknown. Possibly the Hohokam represent the indigenous development of a local Cochise hunting and gathering group with contacts to the south in Mexico, or perhaps they migrated from Mexico already possessing Hohokam traits.

The Colonial (A.D. 500-900) and Sedentary (A.D. 900-1150) periods were a time of population growth and geographical expansion, and represent the flowering of Hohokam culture. Stone, bone, pottery, and shell artifacts became highly ornate and stylized. Monumental architecture, such as artificial mounds and "ball courts", became increasingly common. Interaction with other cultures reached a peak. Mesoamerican trade channels became well established, as evidenced by the occurrence of copper bells, art styles, pyrite mirrors, tropical birds, and other material goods from the south. The general expansion of the period was accompanied by a proliferation of new irrigation canal systems.

As the Sedentary period drew to a close, settlement patterns began to shift. Sites in outlying parts of the culture area were gradually abandoned, with a general contraction toward the Salt, Gila, Santa Cruz, and San Pedro River valleys. Platform mounds became larger and centralized within the community. Ball courts were still present, but reduced in size.

The Classic period (Soho phase) began with an abandonment of the large dispersed sites, such as Snaketown, and their replacement by generally smaller settlements nearby. The use of ball courts declined and ended. Compound walls and post-and-rock-reinforced structures architecturally identify this first Classic phase. Inhumation became a more common form of disposal of the dead in addition to earlier cremation practices. Architecturally, the Soho phase is marked by a range diversity from pithouses to caliche mud structures, implying a period of experimentation. The Civano phase saw the construction of several large settlements such as Casa Grande, which were built near earlier Soho phase structures.

Table 3. The Hohokam Chronology

Period	Phase	Time
Classic	Civano	1300-1450
	Soho	1150-1300
Sedentary	Sacaton	900-1150
Colonial	Santa Cruz	700-900
	Gila Butte	500-700
Pioneer	Snaketown	300-500
	Sweetwater	100-300
	Estrella	100 B.C.-100 A.D.
	Vahki	300 B.C.-100 B.C.

Three pithouses, excavated by Hastings and analyzed by Ambler, provide evidence of occupation of Casa Grande Ruins National Monument by the Santa Cruz phase. Earlier occupations could be inferred from the presence of a few sherds. The Sacaton phase seems also to have seen a fairly large occupation. Almost every site within the monument shows evidence of Soho or early Classic occupation. During the Civano phase over half the sites in the monument were occupied; these are concentrated in the west and west central portions with extensions to the east and south of monument boundaries.

At this time the multi-storied Casa Grande was constructed of unreinforced coursed caliche mud. The area was abandoned by about A.D. 1450.

Archeological Research. Cosmos Mindeleff first stabilized the Casa Grande in 1891, but Jesse W. Fewkes undertook the first extensive excavation of the ruins in 1906 and 1907. He sampled in compounds A, B, C, D, and Clan House 1. His purpose was to define the formal limits of the area, to collect an inventory of artifacts, and to stabilize walls and joints. Documentation of artifacts was not stressed. From his work here, Fewkes believed Casa Grande to be occupied by a stratified society centered around a chief, and believed the Pima and Papago to have been lineal descendants of the Hohokam.

Frank Pinkley, the first resident caretaker (1901) of the monument, continued stabilization efforts for the Casa Grande, and tested the oval-shaped mound between Compounds A and B. Fewkes had suggested this was a reservoir, but Pinkley concluded that it was a place for ceremonies and games.

Harold Gladwin excavated in the monument in 1927, at the beginning of his archeological career. His work stressed the stratigraphic analysis of materials from a controlled excavation in trash mounds at Compounds A and B. His results led him to conclude that the Salado, a late pueblid group, migrated into the Gila-Salt Basin and jointly occupied Casa Grande with the local Hohokam people. He emphasized the stratigraphy of the trash mounds, with little attention to architecture and artifacts found in the areas around them.

A portion of Compound F was excavated by the Van Bergen-Los Angeles Museum Expedition in 1930, but the project was never fully reported. There is some question as to the compound's date; Hayden puts it at late Classic or the Civano phase, while Ambler dates it earlier, from the Soho phase.

In 1934, Russell Hastings directed excavation at AZ AA:2:61 in the monument's southeastern corner, largely to make work for CWA employees. Hastings' report is very general and syntactically quite confusing. Sampling was



intuitive, rather than systematic. The site seems to have been occupied from A.D. 700-1250, and shows a slow transition and development of Hohokam culture from the Sacaton through to the Soho phases. No systematic analysis of recovered material was attempted at the time. Ambler (1961) later analyzed the data as part of his work at Casa Grande.

Ambler performed an intensive inventory survey of the monument in 1956-57, emphasizing definition of site boundaries, and the dating of sites. The monument was found to have sites dating from the Gila Butte phase (Colonial period). Ambler determined that there were seven unexcavated areas of prehistoric occupation in the monument that held potential interpretive and research value.

Roy Reaves, Park Archeologist in 1968, suggested that there are 18 compounds in the monument and that sites AZ AA:2:23-28 on the western boundary might be grouped around a mound and should be considered for future research.

C. Steen conducted limited excavation in 1963 in the southern portion of Compound A because there was no evidence there of massive walls, which are otherwise characteristic of all the ruins in the central and northern area of the compound. Work on four earlier occasions in the same area made fine stratigraphic work untenable. To control the excavation, a grid pattern was laid out over the sample area. Eight pithouse-like structures were uncovered.

In 1970-71, J. Molloy studied a series of holes found in the Casa Grande. He postulated an astronomical explanation--through extrapolation, analogy, and some interesting observations. This evidence indicated to him a heavy Mesoamerican influence and supported his idea of the existence of a stratified social system at Casa Grande.

David Wilcox studied the relationship of the Casa Grande to Compound A in 1975. The following year, in conjunction with Lynette Shenk, he examined the architecture of the Casa Grande and its functional interpretation. Relationships of architectural features in the structure were documented in profile drawings, field notes, and numerous photographs. Critical analysis based on this new information suggested that some controversies about the building could now be resolved.

Research Collections. Collections at the Western Archeological Center consist of 64 boxes of material from Steen's work in Compound A; two boxes of shells and sherds, of mixed provenience and of little research value, from 1967 undocumented stabilization; and the Wilbur Collection SWAC #123, a small collection of ethnographic items. There are baskets and items from the Papago Viikita ceremony in 1912, and two Maricopa Black-on-Red jars. All ethnographic items are in good condition.



Additional items from Casa Grande, primarily from Compounds A and B and Clan House 1, are in the holdings of the Smithsonian Institution. Some material from the Van Bergen Expedition excavation of Compound F is housed at the Arizona State Museum. This material has not been analyzed.

Library Collections. There are about 1300 volumes, consisting of books, manuscripts, tape recordings, and transcripts. Any publication or research material applicable to the area will be added to the collections. There is no limit on library size. The library and its collections will be managed as a resource as important as many of the natural and cultural resources in the monument, and one that is essential to the proper management of the other resources.

Photographic Holdings. The photo collection includes color and black and white prints and color slides. The holdings pertain mostly to Casa Grande history and resources. The museum collections are photographically documented as well. The photo files will be maintained and updated on a continuing basis.

All material now on site should be retained at Casa Grande for reference, research and interpretation.

Architectural Resources. The monument contains both historic and prehistoric structures of architectural significance. A number have been placed on the List of Classified Structures (LCS).

Prehistoric structures on the LCS include Compound A (which includes the Casa Grande), Compound B, Compound C, and the Clan House (Compound G). All of these structures are considered to be of national significance, not only because of their archeological importance, but because of their architectural significance as well. The Casa Grande is the only surviving example of Hohokam "Great House" architecture. The ruins compounds are some of the best preserved examples of Classic Hohokam village architecture found anywhere, and are the only such examples preserved in the National Park System.

Historic structures on the LCS include Building 8 (Oil House), Building 9 (Warehouse), Building 10 (Equipment Building), Building 11 (Shop and Blacksmith Shop), and Building 14 (Ruins Shelter). With the exception of the Ruins Shelter, the buildings are adobe structures built in 1939 and 1940. They are good examples of Civilian Conservation Corps architecture in the Southwest, dating from the period when Casa Grande Ruins National Monument was the administrative headquarters for all southwestern monuments. Building 14 (Ruins Shelter) is a unique steel and concrete structure (Fig. 2) erected over the Casa Grande in 1932. It was designed by Park Service engineers based on a general design suggested by Frederick Law Olmsted, a nationally known landscape architect.

All of the historic structures are considered to be of local significance and are worthy of protection, even though they constitute an intrusion on the prehistoric scene. Building 14 is perhaps the most intrusive structure in this respect, but it will remain necessary until stabilization of the Casa Grande has been accomplished. Since stabilization research and evaluation could conceivably require decades, the ruins shelter will likely remain an important protective feature for years to come.

### Environmental Impacts of Proposed Actions

Proposed actions in this plan aim to eliminate negative or destructive impacts on the monument's resources.

None of the eleven proposed management projects will have a direct effect on the natural environment of the monument. Though some of the projects, such as the inventory of archeological resources (CAGR-9) and the study of water table fluctuation impacts (CAGR-W-1) may recommend actions which would impact on the natural environment, no such actions will occur as part of the projects.

Cultural resources will be directly effected, especially by the stabilization projects (CAGR-A-1, CAGR-A-2, and CAGR-A-5). While the aim of ruins stabilization is the preservation of prehistoric structures, stabilizing materials may replace or cover original ruins material in some instances.

The stabilization of the Casa Grande will insure preservation of this structure. Pre-stabilization research will seek to minimize losses of original material due to stabilization activities, but some such losses are inevitable. Stabilization activities will disturb visitor patterns, present visual intrusions, and disrupt the interpretive program, but these effects will be only temporary.

The stabilization of Compound A (excluding the Casa Grande) will have impacts similar to the Casa Grande stabilization project.

The archeological overview of the Gila basin will be strictly a review of existing literature, and will not involve new site excavation, though additional excavation may be recommended. The overview may also recommend nomination of some sites outside of the monument to the National Register of Historic Places. The project will have the principle effect of encouraging preservation of archeological sites, though it could result in partial destruction of some sites due to excavation. The project will contribute significantly to the monument's interpretive program.

The study of the Casa Grande's astronomical significance will contribute to our understanding of the function of the building. This will enhance the interpretive program and contribute to visitor enjoyment. The study will not alter or destroy archeological resources. It may temporarily disturb visitor patterns, present visual intrusions and disrupt the interpretive program.

The stabilization of Compound B will insure preservation of this group of

structures. As with other stabilization projects, some loss of archeological resources due to the stabilization activities is inevitable. Since Compound B is not open to the public, this project will have no short term adverse effects on visitor activities. The project will allow the eventual opening of Compound B to the public, which will enhance the interpretive program and contribute to visitor enjoyment.

The photographic documentation of artifacts will make important information easily accessible to the monument staff and the public. This will enhance the interpretive program and increase public enjoyment. Though some damage to prehistoric artifacts could inadvertently occur during photographing and measurement, such damage is unlikely. The photographic record will eliminate the greater possibility of damage if the artifacts were shipped to the monument and examined directly by each researcher.

The completion of the excavation report of Compound F is necessary for the full evaluation of the site. It will contribute to the monument interpretive effort. The project will not involve any additional excavation of Compound F.

The inventory and mapping of the archeological resources of the monument and surrounding area is a remote sensing project which will have no direct effect upon the natural or cultural environment. Ground truthing involving subsurface testing will not be done, though some foot survey work is proposed. Recommendations for future excavations may be made.

The historic resources study will produce nominations of five historic structures to the National Register of Historic Places. The nominations will result in a review of the significance of the structures by the Advisory Council on Historic Preservation, and could result in the listing of the structures on the National Register. While the structures are of historical and architectural significance, they also constitute an intrusion upon the prehistoric scene. The Council's decision will be important in determining future management of the buildings.

The inventory of the monument's flora and fauna will assist in the study of environmental changes through time. It will assist in the interpretation of the prehistoric environment and provide information important in preserving the monument's natural environment.

The study of the impact of the dropping water table will provide a better understanding of the far-reaching effects of this important environmental change on the resources of the monument. The project will recommend resource management actions to enhance habitat for natural vegetation.



### Mitigating Measures Included In the Proposed Action

The most significant potential adverse environmental impact of this plan is the irretrievable loss of archeological resources resulting from ruins stabilization activities. Pre-stabilization research programs are included as part of CAGR-A-1, CAGR-A-2, and CAGR-A-5, the three stabilization projects. The objectives of these research programs are (1) to determine the best materials and techniques available for preserving original construction and (2) to assess the extent of possible losses resulting from stabilization activities. If pre-stabilization research indicates that important information may be lost as a result of necessary stabilization procedures, emergency salvage archeological studies of affected structures will be undertaken.

The archeological overview and mapping of archeological resources projects will provide assessments of the research value of sites outside the monument. This will forestall the need for any extensive research excavation within the monument, thus contributing to the preservation of the monument's resources.

Completion of the Van Bergen-Los Angeles Museum Expedition's excavation report of Compound F is substituted for further excavation of the compound, although it may eventually lead to some testing and restudy of the site.

### Adverse Effects Which Cannot Be Avoided Should The Proposals Be Implemented

Studies and projects proposed in this plan are limited to non-disruptive professional surveys and research, except when there are overriding management needs that require excavation to recover threatened data or stabilization of a structure. Of the proposed management actions, only the stabilization projects (CAGR-A-1, CAGR-A-2, and CAGR-A-5) have such potential for disruption. This will occur only to the extent that the projects cannot be designed to avoid destruction of cultural resources, after professional archeological examination and review.

### Relationship Between Local Short-Term Uses Of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Because cultural resources are fragile and non-renewable, their preservation is a primary goal of park management. These resources outside the monument are subject to continuing destruction by land development and vandalism. The intent of the plan is to insure that the monument is managed as a public preserve within which these resources are strictly protected, being disturbed only when there are no other alternatives to meet management, interpretive, or research needs.

The proposed projects in the plan are intended to accomplish the long-term goals of: (1) maintaining the historical and structural integrity of cultural resources and; (2) maintaining the natural spontaneity of the surrounding environment. These actions will minimize the adverse effects of short-term uses such as visitor-use, emergency stabilization, ground-disturbing construction, and archeological excavation.

Irreversible And Irretrievable Commitments of Resources  
Which Would Be Involved in the Proposed Action

Any excavation of archeological or historical sites permanently commits and disrupts the context of these remains. This plan is intended to minimize excavation within the monument and to insure optimum data recovery and integration into the interpretive plan. Where excavation becomes necessary, professional planning and research designs are required. Stabilization work has been done numerous times in the past. The resource has been permanently affected by such action, and will be so affected by further stabilization efforts.

## ALTERNATIVES TO THE PROPOSED PLAN

### Stabilization of the Casa Grande

1. No action, in violation of existing Federal laws and regulations regarding the protection of historic structures.
2. Continued application of present "holding action" preservation techniques.
3. Stabilization only as emergency situations arise.
4. Reconstruction of the structure, resulting in the alteration or destruction of original construction.

All alternatives would result in eventual loss of the cultural resource.

### Stabilization of Compound A (excluding the Casa Grande)

1. No action, in violation of existing Federal laws and regulations regarding the protection of historic structures.
2. Continued application of present "holding action" preservation techniques.
3. Stabilization only as emergency situations arise.
4. Reconstruction of the structures to appear as they might have in the 1300s, resulting in the alteration and destruction of original construction.

All alternatives would result in eventual loss of the cultural resource.

### Archeological Overview of the Gila River Basin

1. No action.
2. A much more limited overview of the immediate monument area. Such an overview would have none of the advantages of a regional synthesis, and would be of little value in answering the most important questions about the Hohokam. An overview limited to Casa Grande would not be adequate for the needs of Hohokam Pima National Monument.

### Study of the Casa Grande's Astronomical Significance

1. No action. Continued interpretation of the building on the basis of an incomplete analysis of the building's astronomical significance done in 1972.
2. Initiation of an intensive study of all possible functions of the Casa Grande.

### Stabilization of Compound B

1. No action, in violation of existing Federal laws and regulations concerning the preservation of historic structures.
2. Continued piecemeal application of capping materials and other "holding action" preservation techniques.
3. Reconstruction of the walls to appear as they did at the time of prehistoric occupation, resulting in alteration and destruction of original construction.

All alternatives would result in eventual loss of the cultural resource.

### Photographic Documentation of Artifacts

1. No action. Continued lack of analysis and inventory of important artifacts.
2. Shipping the artifacts to the Western Archeological Center or Casa Grande Ruins National Monument. Adequate storage space is not available at these institutions.
3. Photographing only a portion of the artifacts.

### Completion of Excavation Report

1. No action.
2. Interpolation of information from other known compounds to interpret Compound F. This would ignore available but uncompiled data from the 1936 excavation, and could easily result in important errors of interpretation.
3. Additional excavation of Compound F, resulting in some loss of archeological resources.



### Inventory and Mapping of Resources of the Monument and Surrounding Area

1. No action, resulting in the possible loss of important but undiscovered sites.

### Historic Resources Study

1. No action, in violation of Federal laws and regulations concerning the protection of historic structures.

### Natural Resources Inventory

1. No action. Acceptance of a continued lack of information about the natural environment of the monument.
2. Inventory of existing flora and fauna only, omitting study of historic and prehistoric species. The resulting inventory would be valuable, but no basis would exist for comparison with the past or analysis of changes through time.
3. Study of historic and prehistoric flora and fauna only, without an inventory of existing species. Again, no basis for analyzing changes would exist.

### Impact of the Dropping Water Table

1. No action. The precise nature and direction of environmental changes resulting from the lowered water table would remain unknown, making protection of the natural environment from further changes difficult.

## CONSULTATION AND COORDINATION

National Park Service employees jointly developed the Natural and Cultural Resources Management Plan and Environmental Assessment with employees from other agencies and consulting individuals.

The following individuals from the National Park Service provided major contributions to the planning process: Sam Henderson, Keith Anderson, Richard Hart, Richard M. Howard, Ann Williams Rathwell, and Milton C. Kolipinski. Steve Nelson extensively revised and updated the document prior to final publication. In addition to the contributions of the National Park Service's Western Archeological Center, three individuals from the Arizona State Museum contributed to the Plan's cultural aspects: William Doelle, Mark Grady, and David Doyel.

Glenn Bennett, a student-intern with the National Park Service from Chabot College, contributed significantly by reviewing early drafts, editing, compiling and coordinating with park staff and the regional office.

Jim Guyton and Bob Alley of the Arizona Department of Health Services, Bureau of Air Quality Control, assisted in the analysis of air quality.

Copies of the Plan and Environmental Assessment will be sent to the following organizations and individuals soliciting their comments. Letters of comment received will be reviewed and acted upon, as appropriate, by the Superintendent. Copies of public comments will be available at Casa Grande Ruins National Monument, the Southern Arizona Group Office in Phoenix, and the National Park Service's Western Regional Office in San Francisco.

Organizations:

Arizona Archeological Society  
Mr. Donald E. Dove  
2602 W. Bloomfield Road  
Phoenix, Arizona 85029

## Advisory Council of Historic Preservation

Arizona Department of Health Services  
Bureau of Air Quality Control  
1740 W. Adams Street  
Phoenix, Arizona 85007

## Arizona State Clearinghouse

Arizona State Historic Preservation Officer  
Arizona State Parks  
1688 West Adams  
Phoenix, Arizona 85007

Arizona State Parks  
1688 West Adams  
Phoenix, Arizona 85007

Casa Grande Valley Historical Society  
404 N. Marshall  
Casa Grande, Arizona 85222

City of Coolidge  
130 W. Central  
Coolidge, Arizona 85228

Coolidge Chamber of Commerce  
320 W. Central Ave.  
Coolidge, Arizona 85228

Gila River Indian Community  
P.O. Box 97  
Sacaton, Arizona 85247

Heritage Conservation and Recreation Service

Pinal County Development Board  
P.O. Box 967  
Florence, Arizona 85232

Pinal County Historical Society  
2201 S. Main  
Florence, Arizona 85232

Pinal County Parks and Recreation  
Adamsville Road  
Florence, Arizona 85232

United States Geological Survey  
230 N. 1st Ave.  
Phoenix, Arizona 85025

Individuals:

Mr. Ben Arnold, Sr.  
544 W. Pima Ave.  
Coolidge, Arizona 85228

Mrs. Charles Bolan  
700 W. Pima Ave.  
Coolidge, Arizona 85228

Mr. Mark Brosseau  
3815 East Bellevue  
Tucson, Arizona 85716

Mr. Craig E. Davids  
432 E. Orlando Circle  
Coolidge, Arizona 85228

Dr. David Doyel  
Arizona State Museum  
University of Arizona  
Tucson, Arizona 85721

33

Dr. A. E. Dittert  
Department of Anthropology  
Arizona State University  
Tempe, Arizona 85281

Ms. Ruth Lorenz  
2120 South Rural Rd.  
Tempe, Arizona 85282

Mr. George Greenslate  
1212 Orlando Dr.  
Coolidge, Arizona 85228

Mrs. S. A. Westerman  
504 Butte Drive  
Florence, Arizona 85232

Dr. Emil W. Haury  
Department of Anthropology  
University of Arizona  
Tucson, Arizona 85721

Dr. David R. Wilcox  
Arizona State Museum  
University of Arizona  
Tucson, Arizona 85721

Mr. Alexander M. Lewis, Sr.  
Gila River Indian Community  
P.O. Box 97  
Sacaton, Arizona 85247

Mrs. Russel Wise  
2707 Clays Alley  
Tucson, Arizona 85716



## REFERENCES

Ambler, John R.

- 1961 Archeological Survey and Excavations at Casa Grande Ruins National Monument, Arizona. MS, Master's Thesis, University of Arizona, Tucson.

Bohrer, Vorsila

- 1970 Ethnobotanical Aspects of Snaketown, A Hohokam Village in southern Arizona. American Antiquity 34 (4): 413-430.
- 1970 Paleoecology of Snaketown. The Kiva 36 (3): 11-19.

Debowski, S. & G. L. Fritz

- 1974 The Archeological Resource of the Middle Gila Planning Unit of the Bureau of Land Management, University of Arizona; Arizona State Museum (MS).

Doyel, David E.

- 1974 Excavations in the Escalante Ruin Group, Southern Arizona, MS. Arizona State Museum, Tucson.
- 1976 Classic Period Hohokam in the Gila River Basin, Arizona The Kiva 42 (1): 27-37.
- 1977 Classic Period Hohokam in the Escalante Ruin Group. MS, Ph.D. Thesis, University of Arizona, Tucson.

Fewkes, Jesse Walter

- 1907 Excavations at Casa Grande, Arizona. Smithsonian Miscellaneous Collections, Vol. 50, Washington, D. C.
- 1909 Prehistoric Ruins of the Gila Valley. Smithsonian Miscellaneous Collections, Vol. 52, Washington, D. C.
- 1912 Casa Grande, Arizona. 28th Annual Report of the Bureau of American Ethnology. Washington, D. C.

Gladwin, Harold S.

- 1928 Excavations at Casa Grande, Arizona. Southwest Museum Papers No. 2, Los Angeles.

Gladwin, Harold S., Emil Haury, E. B. Sayles, and Nora Gladwin

- 1937 Excavations at Snaketown: Material Culture. Medallion Papers No. 25, Gila Pueblo, Globe.

Grady, Mark A.

- 1978 Hohokam Adaptation to the Sonoran Desert: A Regional Synthesis. Arizona State Museum/Western Archeological Center, Tucson.

Hastings, Russell

- 1934 Second Preliminary Report on Excavations at Casa Grande, 1934. Southwestern Monuments Monthly Reports, January, 46-48. Casa Grande Ruins National Monument (Mimeographed).

Haury, Emil W.

- 1932 Roosevelt 9:6, A Hohokam Site of the Colonial Period. Medallion Papers, No. 11, Gila Pueblo, Globe.
- 1945 The Excavation of Los Muertos and Neighboring Ruins in the Salt River Valley, Southern Arizona. Papers of the Peabody Museum of Archeology and Ethnology. Vol. 24, No. 1, Harvard University Cambridge.
- 1976 The Hohokam: Desert Farmers and Craftsmen. University Of Arizona Press. Tucson.

Hayden, Julian D.

- 1957 Excavations, 1940, at University Indian Ruin. Tucson, Arizona. Southwestern Monuments Association Technical Series. Vol. 5, Gila Pueblo, Globe.

Judd, Ira B., James M. Laughlin, Herbert R. Guenther, and Royal Handegarde

- 1971 The Lethal Decline of Mesquite on the Casa Grande National Monument. Great Basin Naturalist 31 (3): 153-159.

Kreigh, James D. and Hossan A. Sultan

- 1974 Final Report - Feasibility Study in Adobe Preservation, Casa Grande National Monument and Fort Bowie National Historic Site, MS., Engineering Experiment Station, College of Engineering, University of Arizona, Tucson.

Laney, R. L., Richard H. Raymond and Carl C. Winikka

- 1978 Water Level Declines, Land Subsidence, and Earth Fissures in South-Central Arizona. U. S. Geological Survey, Tucson.

Midvale, Frank

- 1965 Prehistoric Irrigation of the Casa Grande Ruins Area. The Kiva 30 (3): 82-86
- 1968 Prehistoric Irrigation In The Salt River Valley, Arizona The Kiva 34 (1): 28-32

Mindeleff, Cosmos

1896 Casa Grande Ruin. 13th Annual Report Of The Bureau of American Ethnology. Washington, D.C.

1897 The Repair of the Casa Grande Ruin, Arizona, In 1891. 15th Annual Report Of The Bureau of American Ethnology Washington, D. C.

Molloy, John

1973 The Casa Grande Archeological Zone Precolumbian Astronomical Observation. MS., Arizona Archeological Center, National Park Service, Tucson.

Nickel, Edward A.

1932 Final Construction Report on Casa Grande Ruin Shelter. MS, National Park Service Field Headquarters, San Francisco.

O'Bannon, Charles E. and Bill Wikander

1978 Stabilization Of Prehistoric Adobe Architecture By Electro-Osmosis And Base Exchange Of Ions (Phase II). Arizona State University, Engineering Research Center, Tempe.

Poulson, E. N., Robert Wildermuth and W. G. Harper

1941 Soil Survey Of The Casa Grande Area, Arizona. Bureau Of Plant Industry, U. S. Department of Agriculture. Washington, D. C.

Reaves, Roy W. III

1968 Report on Four New Compound Villages In Casa Grande Ruins National Monument. MS, Arizona Archeological Center, National Park Service, Tucson.

Russell, Frank

1908 The Pima Indians. 26th Annual Report of the Bureau of American Ethnology. Washington, D. C.

Schroeder, Albert H.

1940 A Stratigraphic Survey of Pre-Spanish Trash Mounds of the Salt River Valley. MS., Masters Thesis, University of Arizona, Tucson.

Spears, C, Duane

1973 Test Excavations in Compound B, Casa Grande National Monument. MS, Arizona Archeological Center, National Park Service, Tucson.

Steen, Charlie R.

- 1963 Excavations in Compound A, Casa Grande National Monument. MS, Arizona Archeological Center, National Park Service, Tucson.

Valcarce, Joseph P. and D. W. Kayser

- 1969 Recently Discovered Compounds At Casa Grande Ruins National Monument. The Kiva 35 (1): 55-56

Wasley, Wm. W. and Alfred E. Johnson

- 1965 Salvage Archeology in the Painted Rocks Reservoir. University of Arizona Anthropological Papers, Tucson.

Weaver, D. E.

- 1972 A Cultural-Ecological Model for the Classic Hohokam Period in the Lower Salt River Valley, Arizona. The Kiva, Vol. 28, No. 1, 43-52.

Wilcox, David R.

- 1975 The Relationship of Casa Grande Ruin to Compound A: Research Potential Of The In Situ Deposits. Arizona State Museum/Western Archeological Center, Tucson.

Wilcox, David R. and Lynette O. Shenk

- 1977 The Architecture of the Great House and Its Interpretation. Arizona State Museum/Western Archeological Center, Tucson.





